

Claims

- [c1] 1. A method for controlling activation of a power source of a hybrid electric vehicle, the hybrid electric vehicle having a brake system, first power source, a second power source, a motor connected to the first and second power sources, and a power transfer unit connected to the motor and adapted to drive a vehicle wheel, the method comprising:
determining a vehicle speed value;
determining an operating state of the brake system; and
activating the first power source based on the vehicle speed value and the operating state of the brake system.
- [c2] 2. The method of claim 1 wherein the first power source is an internal combustion engine.
- [c3] 3. The method of claim 1 wherein the first power source is a fuel cell.
- [c4] 4. The method of claim 1 wherein the second power source is a battery.
- [c5] 5. The method of claim 1 wherein the second power source is a capacitor.

- [c6] 6. The method of claim 1 wherein the step of determining an operating state of the brake system further includes determining whether a vehicle brake is released if the vehicle speed value is less than the first threshold value; determining whether additional power is demanded if the vehicle speed value is greater than the first threshold value and less than the second threshold value; activating the first power source if additional power is demanded or if the vehicle speed value is less than the first threshold value and the vehicle brake is released; and deactivating the first power source if the vehicle speed value is less than the first threshold value and the brake is engaged or if additional power is not demanded.
- [c7] 7. The method of claim 6 wherein the step of determining whether additional power is demanded is based on a change in position of a gas pedal detected by a gas position sensor.
- [c8] 8. The method of claim 7 wherein the step of determining whether additional power is demanded includes determining a target torque value and a target power value, comparing the target torque value to a predetermined torque value, comparing the target power value to a predetermined power value, wherein additional power is demanded if either the target torque value exceeds the

predetermined torque value or if the target power value exceeds the predetermined power value.

- [c9] 9. A method for controlling starting and stopping of an engine of a hybrid electric vehicle, the hybrid electric vehicle having an engine, a voltage source, a starter/alternator connected to the engine and the voltage source, a clutch disposed between the engine and the starter/alternator, and a transmission connected to the starter/alternator and adapted to drive a vehicle wheel, the method comprising:
- comparing a vehicle speed to a first threshold value;
- comparing the vehicle speed to a second threshold value;
- determining whether a third threshold value has been exceeded;
- determining whether a vehicle brake is released if the vehicle speed is less than the first threshold value;
- starting the engine if the vehicle speed is less than the first threshold value and the brake is released, if the vehicle speed is greater than the second threshold value, or if the third threshold value has been exceeded; and
- stopping the engine if the vehicle speed is less than the first threshold value and the vehicle brake is engaged or if the third threshold value is not exceeded.

- [c10] 10. The method of claim 9 wherein the third threshold value is indicative of a torque limit of the starter/alternator.
- [c11] 11. The method of claim 9 wherein the third threshold value is indicative of a power limit of the voltage source.
- [c12] 12. The method of claim 9 wherein the first threshold value is less than the second threshold value.
- [c13] 13. The method of claim 9 wherein the vehicle speed is measured by a speed sensor located at the output shaft of the transmission.
- [c14] 14. The method of claim 9 wherein determining whether the vehicle brake is released is based on a change in position of a brake pedal detected by a brake pedal position sensor.
- [c15] 15. The method of claim 9 wherein determining whether the third threshold value has been exceeded is based on a change in position of a gas pedal detected by a gas pedal position sensor.
- [c16] 16. A method for controlling starting and stopping of an engine of a hybrid electric vehicle, the hybrid electric vehicle having an engine and a voltage source connected to a starter/alternator, a transmission connected to the

starter/alternator and adapted to drive a vehicle wheel, the method comprising the steps of:

comparing a vehicle speed to a first threshold value and a second threshold value;

determining whether a vehicle brake is released if the vehicle speed is less than the first threshold value;

determining whether a third threshold value indicative of a torque rating of the starter/alternator or a fourth threshold value indicative of a power rating of the voltage source has been exceeded;

starting the engine if the vehicle speed is less than the first threshold value and the brake is released, if the vehicle speed is greater than the second threshold value, or if the third or fourth threshold values have been exceeded; and

stopping the engine if the vehicle speed is less than the first threshold value and brake is engaged or if the third or fourth threshold values are not exceeded.

- [c17] 17. The method of claim 16 wherein the step of starting the engine includes engaging the clutch.
- [c18] 18. The method of claim 16 wherein the step of stopping the engine includes disengaging the clutch.
- [c19] 19. The method of claim 16 wherein the step of determining whether the vehicle brake is released is based on

a change in position of a brake pedal detected by a
brake pedal position sensor.

- [c20] 20. The method of claim 16 wherein the first threshold
value is less than the second threshold value.